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NOTES ON A PORPOISE OF THE GENUS PRODELPHINUS  
FROM THE HAWAIIAN ISLANDS.

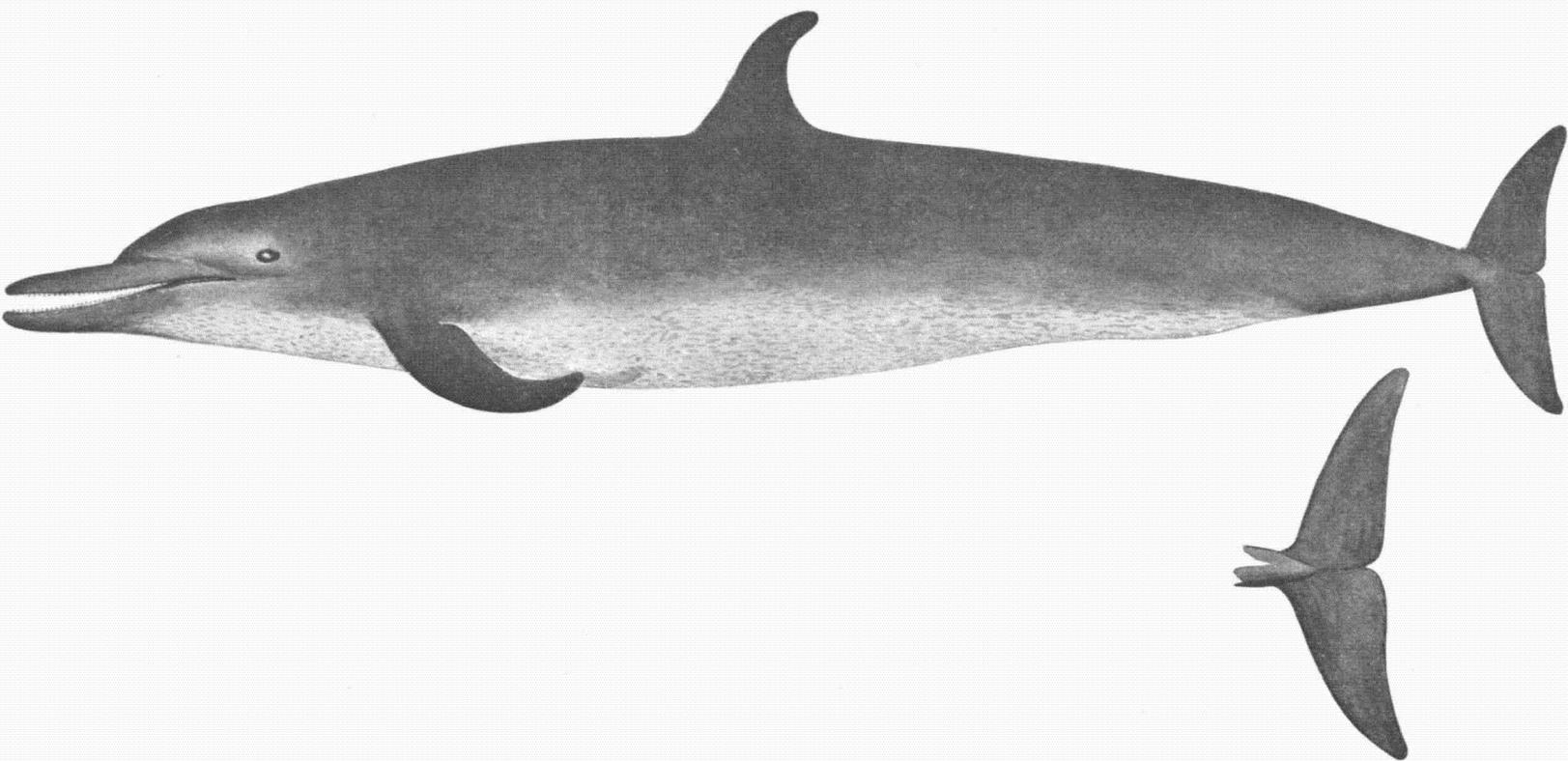
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By **FREDERICK W. TRUE,**  
*Head Curator of the Department of Biology, U. S. National Museum.*

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PORPOISE, *PRODELPHINUS ATTENUATUS* (GRAY). LENGTH, 6 FEET.

## NOTES ON A PORPOISE OF THE GENUS *PRODELPHINUS* FROM THE HAWAIIAN ISLANDS.

BY FREDERICK W. TRUE,

*Head Curator of the Department of Biology, U. S. National Museum.*

During the investigations carried on under the direction of Dr. Jordan and Dr. Evermann by the U. S. Fish Commission steamer *Albatross* in the Hawaiian Islands in 1901, two specimens of a porpoise were obtained at Honolulu. The two heads, together with the pectoral fins, dorsal fin, flukes and a drawing of one of the specimens, made by Mr. A. H. Baldwin, June 7, 1901, were turned over to me by Dr. Jordan, with the request that I should report upon the material.

A preliminary examination of the heads showed that they belonged to a species of *Prodelphinus*. After carefully measuring the heads and taking notes on the coloration, I had the skulls extracted and cleaned. The specimen consisting of the head alone was numbered 112832, U.S.N.M., and the one comprising the head, pectoral and dorsal fins, and flukes, 112833, U.S.N.M. Plate 1 represents No. 112833.

No. 112832, U.S.N.M., head.—The skin of the head is cut off about 2 inches behind the eye. Light yellowish-gray color from farther back and below runs forward to about the line of the eye (on the right side) where it is quite abruptly cut off by a darker tint which goes forward nearly to the stop.<sup>a</sup> The same occurs on the left side but is much more obscure. The darkest of these tints is still lighter than the blackish color which occupies the center of the head from the stop backward. This blackish color forms a triangular median area with the apex at the stop. On the right side over the eye its margin is  $2\frac{1}{2}$  inches above the eye. The snout proper is blackish, except on the edges, where it is irregularly yellowish white with small, distinct, irregularly placed, quite black spots. A narrow band, quite black, starts from the stop, soon divides, and, passing back, the two divisions inclose the eye. The two divisions subdivide into two or three narrower lines with light lines between them. A similar black and a whitish fine line pass from the stop to the corner of the mouth.

On the left side the colors are much darker and the lines are very obscure.

A fine line, lighter than the surrounding color, passes from each side of the blowhole to the stop.

The light color from the pectoral region passes forward underneath on the chin to a point in the median line  $8\frac{1}{2}$  inches from the tip of the mandible. In advance of this the under side of the mandible is very dark yellowish gray, almost black. On the light-gray part of the throat are numerous small, elliptical, dark-gray spots, the largest of which are about three-eighths of an inch long. These can be seen also on the dark part of the mandible. The lower lips are yellowish white, like the upper, with scattered, small, quite black, spots.

No. 112833, U.S.N.M., head, fins, and flukes.—The color is like that of No. 112832, but the markings are more distinct. A blackish cap on the head from the stop broadening out posteriorly. The margin on the right side is 3 inches above the eye. Below this margin on the right side over the eye

<sup>a</sup> The point where the convex outline of the forehead meets the base of the beak.

is a band of lighter gray extending down to 1½ inches above the eye. From this band down to the eye and forward to the stop the color is much lighter gray, which light color extends forward on to the base of the beak.

On the left side the only prominent light patch is at the base of the convexity of the head, about midway between the eye and stop. Under the chin the whitish color extends forward to 5½ inches of tip of mandible. As in the other specimen, a line extends from the stop to the right eye, broadening out posteriorly and inclosing it.

On the right side all the light color on the upper jaw from the eye forward, and all parts of the lower jaw backward to the base of the pectoral, are spotted with dark gray. The dark color of the anterior end of the mandible is made up of very small blackish spots massed together. These spots show also on the upper jaw, the upper lip being irregularly brownish-white and black-spotted.

Pectorals darker than surrounding areas except at base; darker above than below and spotted on both sides, but the spots most distinct on the under side. Dorsal blackish with very obscure small darker spots, especially on the right side, having an antero-posterior direction. Flukes very dark gray above, lighter below, very obscurely spotted with darker color. Margins apparently blackish.

The dimensions of the heads and fins are as follows:

| Measurement.  | No. 112832. | No. 112833. | Measurement.  | No. 112832.    | No. 112833.    |
|---|-------------|-------------|---|----------------|----------------|
|   | mm.         | mm.         |   | mm.            | mm.            |
| Tip of snout to stop (straight) .....   | 121         | 121         | Transverse diameter of blowhole .....                     | 24             | 22             |
| Tip of snout to anterior point of blowhole (straight) .....                     | 314         | 337         | Pectoral, tip to head of humerus (straight) .....         |                | 286            |
| Tip of snout to center of eye (straight) .....                                  | 330         | 337         | Pectoral, tip to anterior insertion .....                 |                | 279            |
| Tip of snout to corner of mouth (straight) .....                                | 283         | 289         | Pectoral, greatest breadth .....                          |                | 86             |
| Breadth of snout at stop (straight) .....                                       | 59          | 56          | Dorsal, height from center of base to tip .....           |                | 203            |
| Breadth of snout midway between stop and tip (straight) .....                   | 43          | 43          | Dorsal, height from base of posterior margin to tip ..... |                | 168            |
| Vertical depth of snout (both jaws, with mouth closed) at stop (straight) ..... | 54          | 60          | Flukes, from tip to tip .....                             |                | 464            |
| Extent of lower jaw beyond the upper .....                                      | 6           | 6           | Flukes, breadth at base .....                             |                | 133            |
| Length of eye .....   | 22          | 19          | Flukes, depth of notch .....                              |                | 25             |
| Antero-posterior diameter of blowhole .....                                     | 13          | 14          | Number of teeth .....                                     | 44-43<br>42-40 | 42-43<br>39-40 |

The dimensions, in millimeters, of the two Hawaiian skulls, together with those of four other skulls of *Prodelphinus* from the Indian Ocean, collected by Dr. W. L. Abbott,<sup>a</sup> are as follows:

| Measurement.  | U.S.N.M. 112832,<br>Hawaii. | U.S.N.M. 112833,<br>Hawaii. | U.S.N.M. 36050 ♀,<br>Amirantes Islands. | U.S.N.M. 36049 ♂,<br>Amirantes Islands. | U.S.N.M. 36051 ♀,<br>Providence Island. | U.S.N.M. 36031 ♀,<br>Alphonse Island. | U.S.N.M. 36048 ♂,<br>Johanna Island. |
|---|-----------------------------|-----------------------------|---|---|---|---------------------------------------|--------------------------------------|
|   | mm.                         | mm.                         | mm.                                     | mm.                                     | mm.                                     | mm.                                   | mm.                                  |
| Total length .....  | 422                         | 443                         | 415                                     | 407                                     | 403                                     | 397                                   | 379                                  |
| Length of beak .....  | 264                         | 269                         | 253                                     | 251                                     | 244                                     | 241                                   | 222                                  |
| Breadth of beak at base of maxillary notches .....                      | 97                          | 92                          | 95                                      | 95                                      | 91                                      | 96                                    | 90                                   |
| Breadth of beak at its middle .....                                     | 48                          | 46                          | 42                                      | 43                                      | 41                                      | 43                                    | 40                                   |
| Breadth of intermaxillæ at middle of beak .....                         | 22                          | 22                          | 24                                      | 25                                      | 23                                      | 26                                    | 23                                   |
| Greatest breadth between outer margins of intermaxillæ proximally ..... | 70                          | 70                          | 66                                      | 67                                      | 65                                      | 70                                    | 64                                   |
| Length of superior tooth line .....                                     | 225                         | 232                         | 220                                     | 212                                     | 215                                     | 209                                   | 191                                  |
| Last tooth to base of maxillary notch .....                             | 45                          | 45                          | 44                                      | 45                                      | 38                                      | 42                                    | 37                                   |
| Extremity of beak to anterior margin of superior nares .....            | 303                         | 321                         | 295                                     | 295                                     | 288                                     | 279                                   | 256                                  |
| Breadth between orbits .....  | 159                         | 164                         | 158                                     | 156                                     | 156                                     | 156                                   | 146                                  |
| Breadth between hind margins of temporal fossæ .....                    | 125                         | 130                         | 122                                     | 127                                     | 122                                     | 123                                   | 117                                  |
| Length of temporal fossæ .....  | 59                          | 62                          | 60                                      | 65                                      | 64                                      | 65                                    | 63                                   |
| Depth of temporal fossæ .....   | 49                          | 50                          | 47                                      | 56                                      | 53                                      | 56                                    | 54                                   |
| Length of mandible .....  | 364                         | 375                         | 350                                     | 347                                     | 342                                     | 327                                   | 316                                  |
| Length of symphysis of mandible .....                                   | 74                          | 77                          | 80                                      | 73                                      | 74                                      | 67                                    | 65                                   |
| Length of tooth row of mandible .....                                   | 211                         | 225                         | 209                                     | 205                                     | 208                                     | 195                                   | 186                                  |
| Depth between angle and coronoid process .....                          | 59                          | 57                          | 57                                      | 63                                      | 59                                      | 62                                    | 53                                   |

<sup>a</sup> See Proc. U.S.Nat.Mus., 17, 1894, p. 33; paper No. 982.

<sup>b</sup> If measured on the continuation of the raised posterior border, = 51 mm; this is the right side. On the left, = 42 mm or 47 mm if measured on the continuation of the posterior raised border.

The number of valid species of the genus *Prodelphinus* is at present uncertain. In 1889, after an examination of the types of many of the nominal species and numerous other specimens belonging to the genus, I arrived at the conclusion that about eight species were probably distinct;<sup>a</sup> of these, the one to which the Hawaiian specimens should most probably be assigned is *Prodelphinus attenuatus* (Gray), of which *P. capensis* (Gray) is, I believe, a synonym.

A comparison of the dimensions of the type skulls of these two species with those of the Hawaiian skulls and Dr. Abbott's Indian Ocean specimens is given in the following table, the various dimensions being reduced to percentages of the total length.

| Measurement.  | Type of <i>P. capensis</i> . | Type of <i>P. attenuatus</i> . | U.S.N.M. 112832, Hawaii. | U.S.N.M. 112833, Hawaii. | U.S.N.M. 36050 ♀, Amirantes Islands. | U.S.N.M. 36049 ♂, Amirantes Islands. | U.S.N.M. 36061 ♀, Providence Island. | U.S.N.M. 36031 ♀, Alphonse Island. | U.S.N.M. 36048 ♂, Johanna Island. |
|---|------------------------------|--------------------------------|--------------------------|--------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------------|-----------------------------------|
|   | mm.                          | mm.                            | mm.                      | mm.                      | mm.                                  | mm.                                  | mm.                                  | mm.                                | mm.                               |
| Total length .....  | 413                          | 383                            | 422                      | 443                      | 415                                  | 407                                  | 408                                  | 397                                | 379                               |
| Length of beak .....  | p. ct. 60.8                  | p. ct. 60                      | p. ct. 62.6              | p. ct. 60.7              | p. ct. 60.9                          | p. ct. 61.7                          | p. ct. 60.8                          | p. ct. 60.7                        | p. ct. 58.6                       |
| Breadth of beak at base of maxillary notches .....                      | 22.8                         | 22.7                           | 22.9                     | 20.8                     | 22.9                                 | 23.3                                 | 22.6                                 | 24.2                               | 23.8                              |
| Breadth of beak at its middle .....                                     | 10                           | 10                             | 11.4                     | 10.4                     | 10.1                                 | 10.6                                 | 10.2                                 | 10.8                               | 10                                |
| Breadth of intermaxillæ at middle of beak .....                         | 5.8                          | 5.2                            | 5.2                      | 5                        | 5.8                                  | 6.1                                  | 5.7                                  | 6.5                                | 6.1                               |
| Greatest breadth between outer margins of intermaxillæ proximally ..... | 16.2                         | 15.9                           | 16.6                     | 15.8                     | 15.9                                 | 16.4                                 | 16.1                                 | 17.6                               | 16.9                              |
| Length of superior tooth line .....                                     | 51.8                         | 50.2                           | 53.3                     | 52.4                     | 53                                   | 52.1                                 | 53.3                                 | 52.6                               | 50.4                              |
| Last tooth to base of maxillary notch .....                             | 10.4                         | 11.2                           | 10.7                     | 10.2                     | 10.6                                 | 11                                   | 9.4                                  | 10.6                               | 9.7                               |
| Extremity of beak to anterior margin of superior nares .....            | 70.7                         | 68.4                           | 71.8                     | 72.5                     | 71.1                                 | 72.5                                 | 71.4                                 | 70.3                               | 67.5                              |
| Breadth between orbits .....  | 39.7                         | 38.4                           | 37.7                     | 37                       | 38.1                                 | 38.3                                 | 38.7                                 | 39.3                               | 38.5                              |
| Breadth between hind margins of temporal fossæ .....                    | 28.8                         | 30.8                           | 30                       | 29.4                     | 29.4                                 | 31.2                                 | 30.3                                 | 31                                 | 30.9                              |
| Length of temporal fossæ .....  | 16.2                         | 17                             | 14                       | 14                       | 14.5                                 | 16                                   | 15.9                                 | 16.4                               | 16.6                              |
| Depth of temporal fossæ .....   | 13.6                         | 13.1                           | 11.6                     | <sup>a</sup> 11.3        | 11.3                                 | 13.2                                 | 13.2                                 | 14.1                               | 14.2                              |
| Length of mandible .....  | 84.7                         | 85.9                           | 86.2                     | 84.6                     | 84.4                                 | 85.2                                 | 84.8                                 | 82.4                               | 83.4                              |
| Length of symphysis of mandible .....                                   | 18.6                         | 19.3                           | 17.5                     | 17.4                     | 19.3                                 | 18                                   | 18.4                                 | 17                                 | 17.1                              |
| Length of tooth row of mandible .....                                   | 50                           | 50.4                           | 50                       | 50.8                     | 50.4                                 | 50.4                                 | 51.6                                 | 50                                 | 49.1                              |
| Depth between angle and coronoid process .....                          | 13.8                         | 13.8                           | 14                       | 12.9                     | 13.4                                 | 15.5                                 | 14.6                                 | 15.6                               | 14                                |
| Teeth .....   | 40-41<br>38-37               | 43-43<br>42-42                 | 44-43<br>42-40           | 42-43<br>39-40           | 38-38<br>36-38                       | 38-38<br>38-37                       | 39-39<br>39-39                       | 44-43<br>40-41                     | 41-39<br>39-40                    |

<sup>a</sup>11.5 per cent if measured on continuation of raised posterior border; this is on the right side. On the left the depth is 9.5 per cent, or, if measured on continuation of posterior border, 10.6 per cent.

The correspondence of proportions in these several skulls is remarkable. Sir William H. Flower, no less than myself, was of the opinion that *P. attenuatus* and *P. capensis* are specifically identical. I have already advanced the view that Dr. Abbott's Indian Ocean specimens also belong to that species,<sup>b</sup> and would now assign the Hawaiian skulls to the same. It will be observed that in the Hawaiian skulls the temporal fossæ are smaller than in the type of *P. attenuatus* or that of *P. capensis*. This might be regarded as of some importance were it not that two skulls from off the Amirantes Islands (Nos. 36049 and 36050 U.S.N.M.), which there is every reason for believing belong to the same species, show an exactly parallel variation as compared with each other.

<sup>a</sup>Bull. U. S. Nat. Mus., 36, 1889, pp. 61-75, 162-166.

<sup>b</sup>Proc. U. S. Nat. Mus., 17, 1894, paper No. 982.

The Hawaiian skulls in one respect differ from all those from the Indian Ocean, namely, that the portion of the maxilla between the maxillary notch and the orbit is thinner. This and the somewhat larger size are the only two points in which these Hawaiian skulls appear to differ from the types of *P. attenuatus* and *P. capensis*. I do not think these are sufficient to warrant a separation of species.

As *P. attenuatus* is a species founded on cranial characters only, the coloration and external proportions of the Hawaiian heads, the size of the fins, and number of phalanges can not be brought into consideration in connection with it. It is of interest, however, to see how they compare with the same characters in Dr. Abbott's Indian Ocean specimens.

The coloration of the two Hawaiian heads is noted on a previous page. No doubt they were somewhat altered by post-mortem changes and the effects of the preservative when I examined them, but these would effect chiefly a deepening of the shades of gray. Beside the heads, I received, as already mentioned, a sketch of one of the specimens (Pl. 1) one-sixth natural size, but the sex was not recorded. It is dated June 7, 1901, and represents No. 112833 U.S.N.M.

In this sketch the specimen is represented as very dark gray, nearly black, on the upper surfaces, head, dorsal fin, upper surface of pectoral fin, upper and lower surfaces of flukes, posterior portion of caudal peduncle, and anterior half of mandible. The lower surfaces, from the middle of the mandible to within about 9 inches of the flukes, and as high up as the line of the insertion of the pectorals, are white, a little tinged with gray. The light and dark colors meet rather abruptly on the sides, but without a well-defined line of demarkation. The white of the lower surfaces is covered with oblong gray spots about three-fourths of an inch long. Similar spots are seen obscurely in the darker color higher up on the sides.

This sketch and the notes on page 44 indicate that the Hawaiian specimens resembled Dr. Abbott's Indian Ocean specimens very closely in coloration. In all of the latter, however, except one, the light and dark colors were said to be separated by a sharply-defined line. This is hardly true of the Hawaiian specimen represented by the water-color sketch, but on the other hand the colors can not be said to merge gradually into each other. If the hypothesis that males in this species have gray spots while females have white spots be accepted, the Hawaiian specimens should be males.

The following measurements of the Hawaiian specimen from which the sketch was made were taken when it was first obtained, June 7, 1901:

No. 112833, U.S.N.M., Honolulu, Hawaii, June 7, 1901.

|   |         |       |   |         |       |
|---|---------|-------|---|---------|-------|
| Total length.....                       | Inches. | 76    | Length of base of dorsal.....                     | Inches. | 9     |
| Tip of snout to "stop".....             |         | 5     | Least depth of caudal peduncle.....               |         | 3     |
| Tip of snout to eye.....                |         | 13    | Expanse of flukes.....                            |         | 18    |
| Tip of snout to origin of pectoral..... |         | 18    | "Length of flukes".....                           |         | 5.5   |
| Tip of snout to origin of dorsal.....   |         | 35    | Distance from anus to notch of flukes.....        |         | 20    |
| Length of upper jaw.....                |         | 11.5  | Distance from anus to "tip of flukes".....        |         | 21    |
| Length of lower jaw.....                |         | 11.63 | Distance between bases of pectorals in front..... |         | 6.5   |
| "Gape".....                             |         | 11.5  | Greatest depth of body.....                       |         | 14    |
| Length of eye.....                      |         | 1     | Girth in front of pectorals.....                  |         | 28.25 |
| Length of pectoral.....                 |         | 11.5  | Girth immediately behind pectorals.....           |         | 30.5  |
| Height of dorsal.....                   |         | 11    | Girth in front of dorsal.....                     |         | 33    |
| Height of dorsal "straight up".....     |         | 7     |   |         |       |

Dr. Abbott furnished a few measurements of his specimens.<sup>a</sup> These are most numerous in the case of No. 36049 U.S.N.M., male, from Amirantes Islands, and this specimen is fortunately almost the same size as the Hawaiian one of which the sketch was made. Measurements from the latter, compared with those recorded by Dr. Abbott, are as follows:

| Measurement.                              | U.S.N.M.<br>36049, male,<br>Amirantes<br>Islands. | U.S.N.M.<br>112833,<br>Hawaiian<br>Islands. |
|---|---|---|
|   | <i>Inches.</i>                                    | <i>Inches.</i>                              |
| Total length.....                         | 74  | 76  |
| Tip of rostrum to base of dorsal fin..... | 33  | 35  |
| Height of dorsal fin.....                 | 5.75  | 7   |
| Breadth of flukes.....                    | 17  | 18  |
| Length of pectoral fin.....               | 10  | 11.5  |

This correspondence of external proportions tends to confirm the opinion derived from the cranial proportions, that Dr. Abbott's specimens and the Hawaiian ones belong to the same species.

In one of Dr. Abbott's specimens, No. 36031 U.S.N.M., a female 6 feet 1 inch long, the girth at the anterior base of the dorsal fin was 38 inches. As the Honolulu specimen, which was 6 feet 4 inches long, had a girth of only 33 inches at this point, the opinion that it was a male is thereby strengthened, since the males are generally more slender than the females.

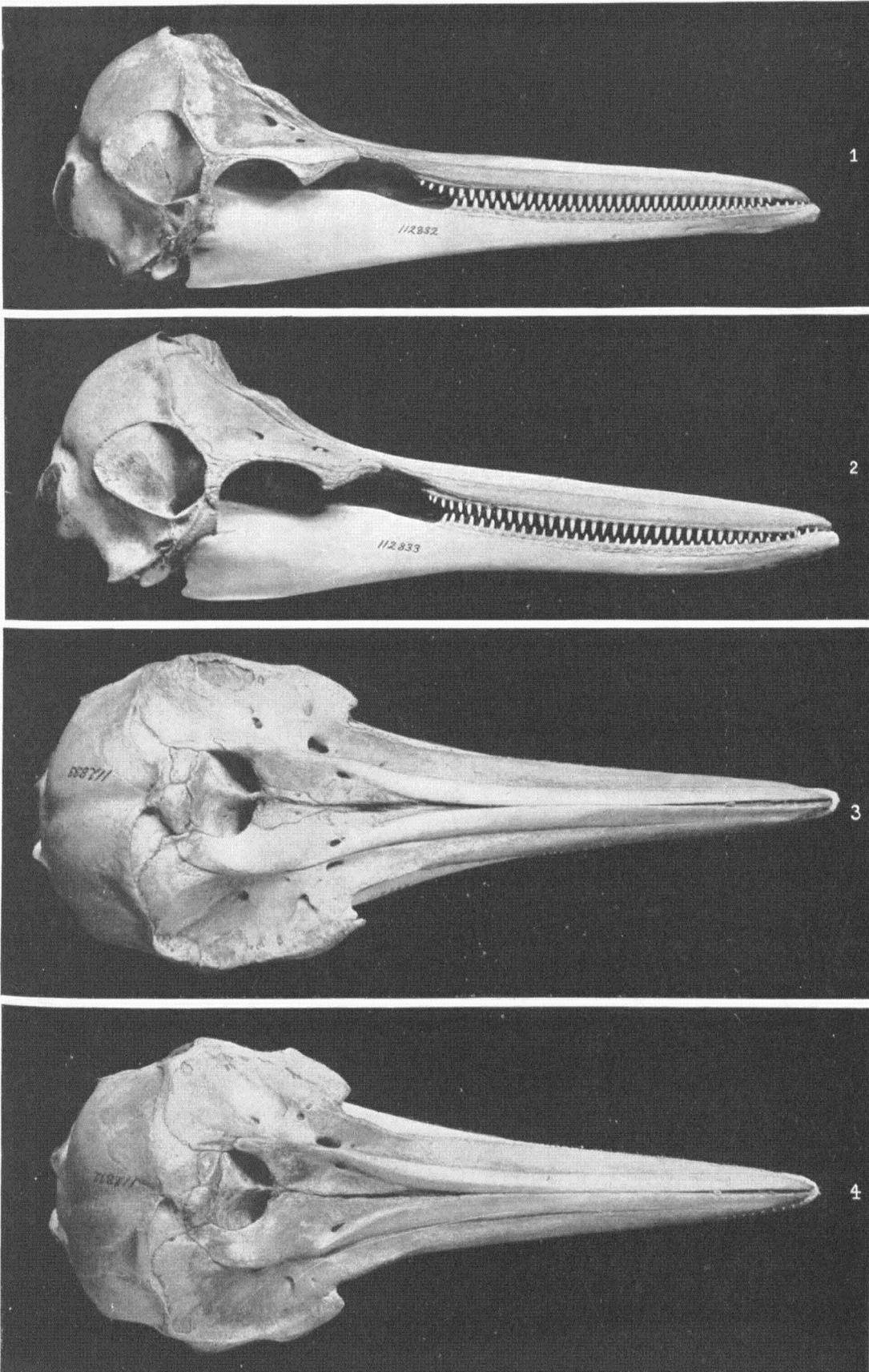
The phalanges in Hawaiian specimen No. 112833 and in three of Dr. Abbott's specimens are as follows:

| Digits.  | U. S. N. M.<br>36048,<br>Johanna<br>Islands. | U. S. N. M.<br>36049,<br>Amirantes<br>Islands. | U. S. N. M.<br>36051,<br>Providence<br>Islands. | U. S. N. M.<br>112833,<br>Hawaiian<br>Islands. |
|----------|--|--|---|--|
| I.....   | 1  | 1  | 1   | 2  |
| II.....  | 8  | 8  | 8   | 8  |
| III..... | 6  | 5  | 5   | 6  |
| IV.....  | 2  | 2  | 2   | 2  |
| V.....   | 1  | 0  | 1   | 1  |

The type of *P. capensis* (Gray), which I believe to be identical with *P. attenuatus* (Gray), was from the Cape of Good Hope. If the other specimens mentioned herein belong to that species also, as I believe they do, *P. attenuatus* would appear to range from the Cape of Good Hope through the Indian Ocean and across the South Pacific to Hawaii. The specimens described by Dr. Lütken in 1889,<sup>b</sup> which appear to belong to *P. attenuatus*, would extend the range of the species into the South Atlantic and as far north as a point about midway between St. Paul Islands and the Cape Verde Islands.

<sup>a</sup> Op. cit., p. 35.

<sup>b</sup> Lütken, C. F. Vidensk. Selsk. Skr., 6 Raek., natur. Afd.; 5 Bd., 1, 1889, p. 45.



VIEWS OF TWO SKULLS OF PRODELPHINUS ATTENUATUS (GRAY), FROM HONOLULU, H. I.

1 and 4. No. 112832, U. S. Nat. Mus.

2 and 3. No. 112833, U. S. Nat. Mus. From the individual figured on Plate 1.